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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/768,153	02/02/2004	Tomoko Miyahara	118505	7247

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EXAMINER	
LUND, JEFFRIE ROBERT	
ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
12/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/768,153	MIYAHARA ET AL.	
	Examiner	Art Unit	
	Jeffrie R. Lund	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-18,33-35 and 37-55* is/are pending in the application.

4a) Of the above claim(s) *7-14,33,43-50 and 55* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-6,15-18,34,35,37-42 and 51-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 6, 15-18, 37-40, 42, and 51-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harutyunyan et al, US Patent Application Publication 2001/0053344 A1, in view of Sugimoto et al, JP 2003-313017.

Harutyunyan et al teaches a carbon nanotube manufacturing apparatus, comprising: a reaction tube 11 in which a carbon nanotube is grown by vapor phase growth; a gas supplying pipe 18 that supplies a carbon-containing raw material 16 carried on a gas flow to an interior of the reaction tube; a heating furnace 12 to heat the interior of the reaction tube; a porous gas decomposer 30 that is placed in the reaction tube to decompose the carbon-containing raw material upon contact with the gas flow; synthesizing portion coated with a metal catalyst 34 that is placed in the reaction tube downstream of the gas decomposer and continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer, to synthesize a carbon nanotube. (Figure 1)

Harutyunyan et al differs from the present invention in that Harutyunyan et al does not teach that the gas decomposer is a molecular sieve or zeolite having a pore diameter of 0.3 to 2nm.

Sugimoto et al teaches a gas decomposer that is a zeolite. (Abstract)

The motivation for replacing the porous gas decomposer of Harutyunyan et al with the zeolite gas decomposer is to supply a porous gas decomposer that has a uniform pore size to more uniformly distribute and decompose the raw material gas.

The motivation for optimizing the pore size is to control the type and amount of raw material gas decomposed by the decomposer. It was held in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), by the Federal Circuit that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. (Also see MPEP 2144.04 (IV)(A))

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the porous gas decomposer of Harutyunyan et al with the zeolite gas decomposer of Sugimoto et al.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

3. Claims 1, 4, 5, 37, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al, US Patent 5,702,532, in view of Sugimoto et al, JP 2003-313017.

Wen et al teaches a carbon nanotube manufacturing apparatus, comprising: a

reaction tube 20; a gas supplying pipe 16 for supplying a raw material gas; a heating furnace 25 to heat the interior of the reaction tube; a gas decomposer (area of the susceptor 21 adjacent the cracking zone 28) that is placed in the reaction tube to decompose the raw material gas upon contact with the gas flow; synthesizing portion 23 that is placed in the reaction tube, downstream of the gas decomposer, and continuously supplied with the raw material gas. (Figure 4) The specific raw material gas supplied to the reaction tube and the material grown is an intended use of the apparatus. Wen et al is capable of supplying a carbon-containing raw material gas and forming nanotubes.

Wen et al differs from the present invention in that Wen et al does not teach that the gas decomposer is a molecular sieve or zeolite having a pore diameter of 0.3 to 2nm.

Sugimoto et al teaches a gas decomposer that is a zeolite. (Abstract)

The motivation for adding the zeolite gas decomposer of Sugimoto et al to the apparatus of Wen et al is to increase the area of the gas decomposer to improve the efficiency of the gas decomposer.

The motivation for optimizing the pore size is to control the type and amount of raw material gas decomposed by the decomposer. It was held in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), by the Federal Circuit that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform

differently than the prior art device, the claimed device was not patentably distinct from the prior art device. (Also see MPEP 2144.04 (IV)(A))

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the zeolite gas decomposer of Sugimoto et al to the apparatus of Wen et al.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

4. Claims 1-4, 6, 15-18, 34, 35, 37-40, 42, and 51-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Someya et al, US Patent Application Publication 2003/0147801 A1, in view of Sugimoto et al, JP 2003-313017.

Someya et al teaches a carbon nanotube manufacturing apparatus, comprising: a quartz reaction tube in which a carbon nanotube 3 is grown by vapor phase growth; a gas supplying pipe that supplies argon and propylene, a carbon-containing raw material carried on a gas flow to an interior of the reaction tube; a heating furnace to heats the interior of the reaction tube to 700 degrees C; a porous alumina substrate and carbon gas decomposer (masked area where not nanotubes grew indicated by reference number 2) that is placed in the reaction tube to decompose the carbon-containing raw material upon contact with the gas flow; synthesizing portion coated with a metal catalyst (area coated by aluminum layer) that is placed in the reaction tube, downstream from the gas decomposer, and continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas

decomposer, to synthesize a carbon nanotube. (Examples)

Someya et al differs from the present invention in that Someya et al does not teach that gas decomposer is a molecular sieve or zeolite having a pore diameter of 0.3 to 2nm.

Sugimoto et al teaches a gas decomposer that is a zeolite. (Abstract)

The motivation for replacing the porous gas decomposer of Someya et al with the zeolite gas decomposer is to supply a porous gas decomposer that has a uniform pore size to more uniformly distribute and decompose the raw material gas.

The motivation for optimizing the pore size is to control the type and amount of raw material gas decomposed by the decomposer. It was held in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), by the Federal Circuit that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. (Also see MPEP 2144.04 (IV)(A))

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the porous gas decomposer of Someya et al with the zeolite gas decomposer of Sugimoto et al.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Response to Arguments

5. Applicant's arguments filed September 12, 2008 have been fully considered but they are not persuasive.

In regard to the argument directed to Harutyunyan et al and features (1) and (2), the Examiner disagrees. The gas decomposer is the substrate and catalyst is the synthesizing portion. The synthesizing portion is placed downstream in the direction for the gas flow, of the gas decomposer and is continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer, specifically, the carbon containing gas is flowed from the inlet 18 downstream to the substrate (gas decomposer) 30 where the gas is decomposed. The decomposed gas then carried by the gas flow downstream from the substrate (gas decomposer) 30 to the synthesizing portion (thus outside of the gas decomposer) where the carbonaceous articles are grown. Thus, Harutyunyan et al teaches the claimed elements (1) and (2).

In regard to the argument that Harutyunyan et al, Wen et al, or Someya et al and Sugimoto et al are directed to different methods and do not teach the motivation for combing the references, the Examiner agrees. However, the Examiner is not limited to the teachings of the references for motivation for the combination of the references, the motivation to do so can be found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation is found in the knowledge

generally available to one of ordinary skill in the art.

In regard to the argument that Sugimoto et al discloses that the zeolite is used in the catalyst, not in a gas decomposer, the Examiner disagrees. Sugimoto et al specifically teaches "SOLUTION: Methane is thermally decomposed at 800-1,300°C on a solid catalyst, preferably a solid catalyst obtained by highly dispersing and carrying metal iron or a metal iron-containing substance **on a zeolite** to produce the objective carbon nanotubes." Thus, Sugimoto et al teaches the catalyst is on the zeolite not in the catalyst as argued; and the rejection is valid.

In regard to the argument directed to *Gardner v. Tec Systems, Inc*, the Examiner disagrees. The Examiner has argued that the only difference between Harutyunyan et al and Sugimoto et al and the present invention in the size of the pore diameters, and that if Harutyunyan et al and Sugimoto et al were made with the same pore diameters they would function in the same manner as the present invention. Thus, the Examiner has made a *prima facie* obvious case based on the teaching of *Gardner v. Tec Systems, Inc* and the MPEP. The Applicant has made no argument or provided any evidence that if the pore sizes of Harutyunyan et al and Sugimoto et al were made to the same size of the pores of the present invention they would not function as claimed. Therefore, the rejection is valid.

In regard to the argument that Wen et al teaches a space or void and not the recited feature (1), the Examiner disagrees. The rejection has been modified to clearly teach that the gas decomposer is the susceptor 21

In regard to the argument that the synthesizing portion is not downstream from

the heat source 25 and susceptor 21 as claimed, the Examiner disagrees. The claims do not require that the synthesizing portion be downstream of the susceptor or heater, the claims require that the synthesizing portion be downstream of the gas decomposer. In Wen et al the synthesizing portion is downstream of the area of the susceptor that is the gas decomposer. The Examiner notes that the claims read on all of the different embodiments. If the Applicant is trying to claim the embodiments in which the gas decomposer is separate from the synthesizing portion (i.e. figure 4, 8, 10), then the Applicant should amend the claims to positive state or describe that the gas decomposer is separate from and does not contact the synthesizing portion as shown in figures 4, 8, and 10. The Idea that synthesizing portion is downstream from the gas decomposer is too broad and does not distinguish from the embodiments in which the synthesizing portion is supported by part of the gas decomposer and downstream from other parts of the gas decomposer.

In regard to the argument that:

> First, the Office Action's motivation to modify Wen by Sugimoto, to "increase the area of the gas decomposer to improve the efficiency of the gas decomposer", does not make sense. As discussed above, the Office Action alleges that Wen's precracking zone 28 corresponds to the claimed gas decomposer. Replacing precracking zone 28 by Sugimoto's solid catalyst (paragraphs [0005]-[0006]) would block the precursors of Wen from reaching wafer 23, rendering Wen's apparatus unsuitable for its intended purpose in violation of MPEP §2143.01(V).

the Examiner disagrees. The suggested combination was not to fill in the precracking zone 28 with a zeolite of Sugimoto et al, the rejection is replacing the portion of the susceptor 21 adjacent the precracking zone 28, thus increasing the area available to decompose (crack) the carbon containing gases. It is well known in the art that increasing the porosity of the surface increases the surface area and increases the heat

transfer rate from the surface to the gas.

In regard to the arguments directed to feature (1) and Someya et al the Examiner disagrees. The rejection has been rewritten to clearly state that the gas decomposer is not the masking tape as argued, but the area of the substrate defined by the substrate in which no nanotubes are formed.

In regard to the argument directed to feature (2) of Someya et al, the Examiner disagrees for the reasons discussed above with regard to Harutyunyan et al.

In regard to the argument that Someya et al teaches pyrolysis and no gas decomposer is needed, the Examiner disagrees. All of the cited references, including the present invention, use pyrolysis to crack a precursor (i.e. a carbon containing material) to produce a product to deposit (i.e. form nanotubes). Thus, the argument is moot.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrie R. Lund/
Primary Examiner
Art Unit 1792

JRL
12/19/08